

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Adam C. Braun, et al.  
Serial No.: Unassigned  
Filing Date: September 9, 2003  
For: POSITION SENSING METHODS FOR  
INTERFACE DEVICES  
Examiner: Unassigned  
Art Unit: 2673

Mail Stop: Patent Application  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**INFORMATION DISCLOSURE STATEMENT**

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, Applicants submit herewith on Form PTO-1449 a listing of documents submitted in the parent application. Applicants respectfully request consideration of the cited documents and making the same of record in the prosecution of the above-identified application. In so doing, Applicants do not waive any rights to take appropriate action to establish patentability over the listed documents should they be applied as references against the claims of the present application.

This Information Disclosure Statement is being submitted with the application, and, therefore, no certification or fee is required (37 C.F.R. § 1.97b(1)). However, should any fees be due, the Commissioner is authorized to charge such fees to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

Respectfully submitted,



John C. Alemanni  
Reg. No. 47,384

Date: September 9, 2003

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<b>Form 1449 (Modified)</b>  <b>Information Disclosure Statement By Applicant</b>  (Use Several Sheets if Necessary)	Atty Docket No.	Applic. No.:
	IMM1P050A	09/571,397
	Applicant:	
	Martin et al.	
	Filing Date: 5/15/00	Group 2673

## U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A	3,490,059	1/13/70	Paulsen et al.	73	133	6/6/66
	B	3,903,614	9/9/75	Diamond et al.	35	12S	3/27/70
	C	3,919,691	11/11/75	Noll	340	172.5	5/26/71
	D	4,148,014	4/3/79	Burson	340	709	4/6/77
	E	4,227,319	10/14/80	Guy et al.	35	12S	3/5/79
	F	4,398,889	8/16/83	Lam et al.	434	45	6/8/81
	G	4,477,043	10/16/84	Repperger	244	223	10/16/84
	H	4,560,983	12/24/85	Williams	340	825	9/17/82
	I	4,603,284	7/29/86	Perzley	318	568	6/5/84
	J	4,632,341	12/30/86	Repperger et al.	244	230	2/6/85
	K	4,677,355	6/30/87	Baumann	318	160	5/27/86

## Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	L	0 085 518	8/10/83	EPO			X	
	M	0 111 992	6/27/84	EPO			X	
	N	0470257A1	12.02.92	EPO			X	
	O	0655301A1	31.05.95	EPO			X	
	P	WO9520788	03.08.95	PCT			X	

## Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Frederick P. Brooks, Jr. et al., "Project GROPE-Haptic Displays for Scientific Visualization," Computer Graphics, Vol. 24 # 4, Aug. 1990, pp. 177-185.
	S	Louis Rosenberg, "A Force Feedback Programming Primer," Immersion Corporation, 1997, pp. 1-176.
	T	Patrick Fischer et al., "Specification and Design of Input Devices for Teleoperation," IEEE CH2876-1, 1990, pp. 540-545.
Examiner		Date Considered

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#### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A	4,734,685	3/29/88	Watanabe	340	710	7/18/84
	B	4,775,289	10/4/88	Kazerooni	414	735	9/25/87
	C	4,795,296	1/3/89	Jau	414	5	11/17/86
	D	4,800,721	1/31/89	Cemenska et al.	60	393	2/13/87
	E	4,811,608	3/14/89	Hilton	73	862.04	11/6/86
	F	4,815,006	3/89	Andersson et al.	395	89	
	G	4,819,195	4/4/89	Bell et al.	364	571.05	1/20/87
	H	4,823,634	4/25/89	Culver	74	471 XY	11/3/87
	I	4,840,634	6/89	Muller et al.	623	24	
	J	4,868,549	9/19/89	Affinito et al.	340	710	5/18/87
	K	4,914,976	4/10/90	Wyllie	74	523	4/13/88

#### Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	L	0875819	Nov 11 98	EPO			X	
	M	WO9532459	11/30/95	PCT			X	
	N	0470257A1	Feb 12 92	EPO			X	
	O	0655301A1	May 31 95	EPO			X	
	P	0626634A2	Nov 30 94	EPO			X	

#### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	J. Edward Colgate et al., "Implementation of Stiff Virtual Walls in Force-reflecting Interfaces," Dept. of Mechanical Engineering, Northwestern Univ., Evanston IL. 1993, pp. 1-7.
	S	Antal K. Bejczy et al., "The Phantom Robot: Predictive Displays for Teleoperation with Time Display," IEEE CH2876-1, 1990, pp. 546-550.
	T	Louis B. Rosenberg, "The Use of Virtual Fixtures as Perceptual Overlays to Enhance Operator Performance in Remote Environments" Crew Systems Directorate Biodynamics and Biocommunications Div., Wright -Patterson AFB OH 45433-7901, 1992, pp. 1-42.
Examiner		Date Considered

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Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
	A	4,935,728	6/19/90	Kley	340	709	11/20/87
	B	4,961,038	10/2/90	MacMinn	318	696	10/16/89
	C	4,962,448	10/9/90	DeMaio et al.	364	146	9/30/88
	D	4,982,504	1/8/91	Soderberg et al.	33	502	2/17/89
	E	4,983,901	1/8/91	Lehmer	318	685	4/21/89
	F	5,007,300	4/16/91	Siva	74	471 XY	1/22/90
	G	5,044,956	9/3/91	Behensky et al.	434	45	1/12/89
	H	5,076,517	12/31/91	Ferranti et al.	244	228	8/14/89
	I	5,107,080	4/92	Rosen	200	6A	
	J	5,116,051	5/26/92	Moncrief et al.	273	448 B	6/8/90
	K	5,116,180	5/92	Fung et al.	414	5	

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							Yes	No
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	M							
	N							
	O							
	P							

#### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Louis B. Rosenberg, "Virtual Fixtures as Tools to Enhance Operator Performance in Telepresence Environments," SPIE Telemanipulator Technology, 1993.
	S	Louis B. Rosenberg, "Perceptual Design of a Virtual Rigid Surface Contact", Armstrong Laboratory, Crew Systems Directorate, Air Force Materiel Command, 1993, pp. 1-40.
	T	Bernard D. Adelstein et al., "A High Performance Two Degree-of-freedom Kinesthetic Interface", MIT, Cambridge, MA, 1992, pp. 108-112.
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### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
	A	5,125,261	6/30/92	Powley	73	1J	5/28/91
	B	5,142,931	9/1/92	Menahem	74	471 XY	2/14/91
	C	5,143,505	9/1/92	Burdea et al.	414	5	2/26/91
	D	5,146,566	9/8/92	Hollis Jr. et al.	395	275	5/29/91
	E	5,148,377	9/15/92	McDonald	364	560	6/12/89
	F	5,156,363	10/20/92	Cizewski et al.	244	223	2/28/91
	G	5,182,557	1/93	Lang	341	20	
	H	5,184,319	2/2/93	Kramer	364	806	2/2/90
	I	5,185,561	2/9/93	Good et al.	318	432	7/23/91
	J	5,193,963	3/16/93	McAfee et al.	414	5	10/31/90
	K	5,195,179	3/16/93	Tokunaga	395	161	5/21/90

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	N							
	O							
	P							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Tan, H. et al., "Human factors for the design of force-reflecting haptic interfaces", Dept. Of Mech Engineering, MIT, 1994, pp. 1-11.
	S	Tetsuo Kotoku, "A Predictive Display with Force Feedback and its Application to Remote Manipulation System with Transmission Time Delay", IEEE 0-7803-0737-2, 1992, pp. 239-246.
	T	Louis B. Rosenberg et al., "The use of force feedback to enhance graphical user interfaces," Stereoscopic Displays and Virtual Reality Systems, Proc. SPIE 2653, 19, 1996, pp. 243-248.
Examiner		Date Considered

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### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A	5,204,600	4/20/93	Kahkoska	318	602	2/6/91
	B	5,206,930	4/27/93	Ishikawa et al.	395	95	2/7/92
	C	5,209,131	5/11/93	Baxter	73	865.8	10/12/90
	D	5,220,260	6/15/93	Schuler	318	561	10/24/91
	E	5,223,776	6/93	Radke et al.	318	568.1	
	F	5,228,356	7/20/93	Chuang	74	471	11/25/91
	G	5,230,623	7/27/93	Guthrie et al.	433	72	12/10/91
	H	5,235,868	8/17/93	Culver	74	471 XY	10/2/91
	I	5,239,246	8/24/93	Kim	318	568	7/8/92
	J	5,254,919	10/19/93	Bridges et al.	318	560	3/22/91
	K	5,264,768	11/23/93	Gregory et al.	318	561	10/6/92

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							Yes	No
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	O							
	P							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Bernard D. Adelstein et al., "Design and Implementation of a Force Reflecting Manipulandum for Manual Control Research" NASA Ames Research/Dept. of Mechanical Engineering, MIT, 1992, pp. 1-24.
	S	Pietro Buttolo et al., "Pen-based Force Display for Precision Manipulation in Virtual Environments", IEEE 0-8186-7084-3, 1995, pp. 217-224.
	T	Brain Schmolt et al., "Application Areas for a Force-feedback Joystick", DSC-Vol. 49, Advances in Robotics, Mechatronics, and Haptic Interfaces, 1993, pp. 47-54.
Examiner		Date Considered

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### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A	5,286,203	2/15/94	Fuller et al.	434	45	10/7/92
	B	5,296,846	3/22/94	Ledley	345	161	10/5/92
	C	5,296,871	3/22/94	Paley	345	163	7/27/92
	D	5,327,790	7/12/94	Levin et al.	73	862.325	6/19/92
	E	5,341,459	8/23/94	Backes	395	95	8/9/91
	F	5,355,148	10/11/94	Anderson	345	166	1/14/93
	G	5,374,942	12/20/94	Gilligan et al.	345	157	8/12/93
	H	5,389,865	2/14/95	Jacobus et al.	318	568.11	12/2/92
	I	5,396,266	3/7/95	Brimhall	345	161	6/8/93
	J	5,398,044	3/14/95	Hill	345	145	12/7/93
	K	5,402,582	4/4/95	Raab	33	503	2/23/93

### Foreign Patent or Published Foreign Patent Application

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							Yes	No
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	O							
	P							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	S.C. Jacobson et al., "High Performance, High Dexterity, Force Reflective Teloperator II", ANS Topical Meeting on Robotics and Remote Systems, 1991, pp. 1-10.
	S	Margaret Minsky, et al., "Feeling and Seeing: Issues in Force Display", Dept. of Computer Science, University of NC at Chapel Hill, ACM 1990 089791-351-5, pp. 235-242, 270.
	T	Koichi Hirota et al., "Development of Surface Display", IEEE O-7803-1363-1, 1993, pp. 256-262.
Examiner		Date Considered

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Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A	5,405,152	4/11/95	Katanics et al.	273	438	6/8/93
	B	5,414,337	5/9/95	Schuler	318	561	6/11/93
	C	5,473,235	12/5/95	Lance et al.	318	561	12/21/93
	D	5,477,237	12/19/95	Parks	345	156	7/14/94
	E	5,482,051	1/96	Reddy et al.	128	733	
	F	5,512,919	4/30/96	Araki	345	156	03/30/93
	G	5,513,100	4/30/96	Parker et al.	364	167.01	06/10/93
	H	5,551,701	9/3/96	Bouton et al.	463	36	1/5/94
	I	5,570,111	10/29/96	Barrett et al.	345	157	10/3/94
	J	5,576,727	11/19/96	Rosenberg et al.	345	179	06/05/95
	K	5,587,937	12/24/96	Massie et al.	364	578	4/25/95

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							Yes	No
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	M							
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	O							
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### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	A.J. Kelley et al., "Magicmouse: Tactile and Kinesthetic feedback in the Human-compute Interface Using an Eletromagnetically Actuated Input/output Device", Dept. of Electrical Engineering, University of British Columbia, Vancouver, BC, 1993, pp. 1-27.
	S	Hiroo Iwata, "Artificial Reality with Force-feedback: Development of Desktop Virtual Space with Compact Master Manipulator", ACM 0-89791-344-2, 1990, pp. 165-170.
	T	Vincent Hayward et al. "Design and Multi-Objective Optimization of a Linkage for a Haptic Interface," Advances in Robot Kinematics and Computationed Geometry, Kluwer Academic Publishers, 1994, pp. 359-368.
Examiner		Date Considered

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### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
	A	5,589,828	12/31/96	Armstrong	341	20	03/05/92
	B	5,589,854	12/96	Tsai	345	161	
	C	5,591,082	1/7/97	Jensen et al.	463	38	1/5/95
	D	5,611,731	3/18/97	Bouton et al.	463	37	9/8/95
	E	5,623,582	4/97	Rosenberg	395	99	
	F	5,629,594	5/13/97	Jacobus et al.	318	568.11	10/16/95
	G	5,642,469	06/24/97	Hannaford et al.	395	99	11/03/94
	H	5,643,087	7/97	Marcus et al.	463	38	
	I	5,656,901	8/12/97	Kurita	318	436	4/21/95
	J	5,666,138	09/09/97	Culver	345	161	11/22/94
	K	5,680,141	10/97	Didomenico et al.	342	372	

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	O							
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### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Kilpatrick, Paul Jerome, "The Use of Kinesthetic Supplement in an Interactive Graphics System", University of North Carolina at Chapel Hill, 1976, pp. 1- 175.
	S	Winey III, Calvin, "Computer Simulated Visual and Tactile Feedback as an Aid to Manipulator and Vehicle Control," Dept. of Mech. Engineering, MIT, 1981, pp. 1-79.
	T	Hannaford, B. et al., "Performance Evaluation of a Six-Axis Generalized Force-Reflecting Teleoperator," IEEE Transactions on Systems, Man, and Cybernetics, Vol. 21, No. 3, 1991, pp. 620-623, 631-633.
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Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
	A	5,694,153	12/97	Aoyagi et al.	345	161	
	B	5,709,219	1/20/98	Chen et al.	128	782	8/1/96
	C	5,714,978	2/3/98	Yamanaka et al.	345	157	12/5/95
	D	5,721,566	2/24/98	Rosenberg et al.	345	161	6/9/95
	E	5,724,068	3/98	Sanchez et al.	345	161	
	F	5,724,264	3/3/98	Rosenberg et al.	364	559	8/7/95
	G	5,727,188	3/10/98	Hayes	395	500	1/19/96
	H	5,731,804	3/24/98	Rosenberg	345	156	1/18/95
	I	5,734,373	3/98	Rosenberg et al.	345	161	
	J	5,742,278	4/21/98	Chen et al.	345	156	11/1/95
	K	5,742,278	4/98	Chen et al.	345	156	

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### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Atkinson, W. et al., "Computing with Feeling," Comput. & Graphics, Vol. 2, 1977, pp. 97-103.
	S	Millman, Paul et al., "Design of a Four Degree-of-Freedom Force-Reflecting Manipulandum with a Specified Force/Torque Workspace," Proc. of 1991 IEEE Int'l Conf. on Robotics and Automation, IEEE, 1991, pp. 1488-1493.
	T	Howe, R. et al., "Task Performance with a Dextrous Teleoperated Hand System," Telemanipulator Technology '92, Proc. of SPIE, Vol. 1833, 1992, pp. 1-9.
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	A	5,749,577	5/12/98	Couch et al.	273	148B	5/31/95
	B	5,754,023	5/19/98	Roston et al.	318	561	10/22/96
	C	5,755,577	5/26/98	Gillio	434	262	7/11/96
	D	5,760,764	6/2/98	Martinelli	345	160	12/13/95
	E	5,767,839	6/16/98	Rosenberg	345	161	3/3/95
	F	5,769,640	6/23/98	Jacobus et al.	434	262	8/10/95
	G	5,771,037	6/23/98	Jackson	345	157	7/24/95
	H	5,781,172	7/14/98	Engel et al.	345	164	6/16/97
	I	5,790,108	8/4/98	Salcudean et al.	345	184	10/23/92
	J	5,805,140	9/8/98	Rosenberg et al.	345	161	11/17/95
	K	5,818,426	10/98	Tierney et al.	345	161	

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### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Batter, J. et al., "Grobe-1: A Computer Display to the Sense of Feel," Proc. IFIP Congress 1971, pp 759-763.
	S	Ouh-young, M., "Force Display in Molecular Docking," Dept. of Computer Science, Univ. of N. Carolina at Chapel Hill, 1990, pp. 1-12, 66-85.
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Examiner		Date Considered

Examiner: Initial citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant

<b>Form 1449 (Modified)</b>  <b>Information Disclosure Statement By Applicant</b>  (Use Several Sheets if Necessary)	Atty Docket No. IMM1P050A	Serial No.: 09/571,397
	Applicant: Martin et al. Filing Date: 5/15/00	Group 2673

### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
	A	5,821,920	10/13/98	Rosenberg et al.	345	156	3/28/97
	B	5,823,876	10/20/98	Unbehand	463	37	5/3/96
	C	5,825,308	10/20/98	Rosenberg	341	20	11/26/96
	D	5,828,197	10/98	Martin et al.	318	567	
	E	5,831,593	11/98	Rutledge	345	156	
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	G	5,844,392	12/1/98	Peurach et al.	318	568.17	5/21/97
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	K	5,959,613	9/28/99	Rosenberg et al.	345	161	11/13/96

### Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	L							
	M							
	N							
	O							
	P							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Rosenberg, L. et al., "Commercially Viable Force Feedback Controller for Individuals with Neuromotor Disabilities," Crew Systems Directorate, Wright-Patterson AFB, 1996, pp. 1-33.
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Examiner		Date Considered

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	Martin et al.	
	Filing Date: 5/15/00	Group 2673

#### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
	A	6,100,874					
	B						
	C						
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	K						

#### Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	L							
	M							
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#### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Russo, "The Design and Implementation of a three Degree-of-Freedom Force Output Joystick," 5/11/90, Dept. of Mech. Engineering, 1990.
	S	Snow et al., "Compact Force-Reflecting Hand Controller," NASA Tech Brief, Vol. 15, No. 4, Item #153, 1991, pp. 1-15a.
	T	J.N. Herndon, et al., "The State-of-the-Art Model M-2 Maintenance System," 1984, 1984 Topical Meeting on Robotics and Remote Handling in Hostile Environments, pp. 59-66.
Examiner		Date Considered

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	G						
	H						
	I						
	J						
	K						

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							Yes	No
	L							
	M							
	N							
	O							
	P							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	R	Meyer et al., "A Survey of Position Trackers," Presence, Vol. 1, No. 2, 1992, pp. 173-200.
	S	
	T	
Examiner		Date Considered

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